

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference AZ05-275WOWW	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/KR 2005/003760	International filing date (<i>day/month/year</i>) 8 November 2005 (08.11.2005)	(Earliest) Priority Date (<i>day/month/year</i>) 11 November 2004 (11.11.2004)
Applicant <div style="text-align: center;">LG ELECTRONICS INC.</div>		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 5 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☒ The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see continuation of this first sheet.

2. ☐ **Certain claims were found unsearchable** (see continuation of this first sheet)

3. ☐ **Unity of invention is lacking** (see continuation of this first sheet)

4. With regard to the title,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

☐ the text is approved as submitted by the applicant.

☒ the text has been established, according to Rule 38.2(b), by this Authority as it appears in the continuation of this first sheet. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

a. the figure of the drawings to be published with the abstract is Figure No. 3

☒ as suggested by the applicant.

☐ as selected by this Authority, because the applicant failed to suggest a figure.

☐ as selected by this Authority, because this figure better characterizes the invention.

b. ☐ none of the figures is to be published with the abstract.

Continuation of first sheet**Continuation No. IV:****Text of the abstract****(Continuation of item 5 of the first sheet)**

The present invention provides a direct drive motor (5) in a washing machine including a stator (14) having a winding portion with coils wound thereon, a rotor (13) having a sidewall (13b), and a rear wall (13a) with a pass through hole (131) at a center, and fastening pass through holes (138) around the pass through hole (131), an annular washer (30) in close contact with, and fixedly secured to, the rear wall (13a) of the rotor (13), the annular washer (30) having fastening pass through holes (300) in a surface thereof in correspondence to fastening pass through holes (138) in the rear wall (13a) of the rotor (13), a connector (16) of resin having a vibration mode different from the washing shaft (4), fixedly secured to an inner side of the rear wall (13a) of the rotor (13) for supporting the washing shaft (4), the connector (16) having fastening pass through holes (162) in correspondence to the fastening pass through holes (138) around the pass through hole (131), bolts (B) passed through the fastening pass through holes in the connector (16), the rotor (13), and the washer (30), and nuts (N) fastened to threads on the bolts (B) for holding the connector (16), the rotor (13), and the washer (30) together.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR 2005/003760

A. CLASSIFICATION OF SUBJECT MATTER

IPC⁸: **H02K 1/30** (2006.01); **H02K 1/28** (2006.01); **D06F 37/30** (2006.01); **D06F** (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC⁸: H02K; D06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, espacenet, WPI,

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2002/077352 A2 (EMERSON El. Co.) 3 October 2002 (03.10.2002) . <i>paragraphs 0004-0014, 0017-0020, 0037-0059; figures</i>	1-20
A	JP 2002/238227 A (Nidec Shibaura Corp.) 23 August 2002 (23.08.2002) . <i>abstract; figures</i>	1-20
A	WO 1998/000902 A1 (Domel Elektromotorji in Gospod. Aparati) 8 January 1998 (08.01.1998) . <i>page 4 line 14 - page 7 line 4; figures 1-4, 6</i>	1-20

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search
12 January 2009 (12.01.2009)Date of mailing of the international search report
9 March 2009 (09.03.2009)Name and mailing address of the ISA/ AT
Austrian Patent Office
Dresdner Straße 87, A-1200 Vienna

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR 2005/003760

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,A	US 2005/210604 A1 (Bertram Schmid et al) 29 September 2005 (29.09.2005) . <i>paragraphs 0007-0021, 0027-0030; figures</i> -----	1-20

PATENT COOPERATION TREATY

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PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing <i>(day/month/year)</i>	9 March 2009 (09.03.2009)
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Applicant's or agent's file reference
AZ05-275WOWW

FOR FURTHER ACTION
 See paragraph 2 below

International application No.
PCT/KR 2005/003760

International filing date *(day/month/year)*
 8 November 2005 (08.11.2005)

Priority Date *(day/month/year)*
 11 November 2004 (11.11.2004)

International Patent Classification (IPC) or both national classification and IPC
H02K 1/30 (2006.01); H02K 1/28 (2006.01); D06F 37/30 (2006.01); D06F (2006.01)

Applicant
LG ELECTRONICS INC.

1. This opinion contains indications relating to the following items:

- ☒ Cont. No. I Basis of the opinion
- ☐ Cont. No. II Priority
- ☐ Cont. No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Cont. No. IV Lack of unity of invention
- ☒ Cont. No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Cont. No. VI Certain documents cited
- ☐ Cont. No. VII Certain defects in the international application
- ☐ Cont. No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/KR 2005/003760

Continuation No. I

Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of a translation from the original language into the following language: ENGLISH, which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
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Continuation No. V

Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 1-20	YES
	Claims ----	NO
Inventive step (IS)	Claims 1-20	YES
	Claims ----	NO
Industrial applicability (IA)	Claims 1-20	YES
	Claims ----	NO

2. Citations and explanations:

Reference is made to the following documents:

D1: WO 2002/077352 A2

D2: JP 2002238227 A

D3: WO 1998/00902 A1

D4: US 2005/210604 A1

D1 discloses a washing machine including a tub that is rotated by a switched reluctance motor. The tub includes an outer tub and an inner tub. The drive is a direct drive or a drive assembly that includes a shaft, a belt and a spinner pulley connected to the tub. The switched reluctance motor includes a stator with a plurality of circumferentially-spaced stator segment assemblies. Winding wire is wound around a stator segment core of the stator segment assemblies. A rotor is connected to the shaft that drives the belt and rotates the spinner pulley. A drive circuit energizes the winding wire around the stator segment assemblies based on a rotational position of the rotor. End cap assemblies are

connected to opposite axial ends of the stator segment core. The end cap assemblies define an annular channel for receiving the winding wire and for preventing winding creep.

D2 teaches providing a direct drive motor for washing machine in which the degree of freedom is increased in design while decreasing the number of components. The motor comprises a rotor having a rotary magnetic body magnetized alternately with different poles along the circumferential direction and a plurality of blade members provided along the circumferential direction of the rotary magnetic body, and a stator disposed to enclose the rotor and arranged with a coil along the circumferential direction.

D3 shows an electronically commutated motor for direct drive of a washing machine drum, wherein the rotor is fixed directly to the driving shaft of the drum, with the stator being fixed to the cross-shaped support of the drum. The structure of an electronically commutated motor for direct drive of a washing machine drum makes it possible, through an optimal stator pole/intermediate space width ratio, and with an uneven air gap between the stator and the rotor, to achieve a low noise level and a relatively high moment at the motor shaft. The number of rotor poles represented by magnetic segments is greater than the number of stator poles with coils, the rotor poles/stator poles ratio factor equalling 1.3333, and the stator pole/intermediate space width ratio between the stator poles equalling 1.868.

D4 relates to a motor having a stator and a rotor providing as a direct drive for a laundry treatment appliance. The stator of the motor is preferably centered by a preferably cylindrical or conical protuberance in a bearing hole in a bearing spider or a rear wall of a tub of the laundry treatment appliance. The stator may have lugs on pole insulation which guide the rotor during installation, so that permanent-magnet poles of the rotor cannot strike soft-magnetic poles of the stator.

The present application provides a direct drive motor in a washing machine including a stator having a winding portion with coils wound thereon, a rotor having a sidewall, and a rear wall with a pass through hole at a center, and fastening pass through holes around the pass through hole, an annular washer in close contact with, and fixedly secured to, the rear wall of the rotor, the annular washer having fastening pass through holes in a surface thereof in correspondence to fastening pass through holes in the rear wall of the rotor, a connector of resin having a vibration mode different from the washing shaft, fixedly secured to an inner side of the rear wall of the rotor for supporting the washing shaft, the connector having fastening pass through holes in correspondence to the fastening pass through holes around the pass through hole, bolts passed through the fastening pass through holes in the connector, the rotor, and the washer, and nuts fastened to threads on the bolts for holding the connector, the rotor, and the washer together.

Neither of the prior art documents cited in the international search report discloses or suggests a direct drive motor in a washing machine which has a rotor having pass through hole at a center and which has a connector of resin having a vibration mode different from the washing shaft, fixedly secured to the rear wall of the rotor for supporting the washing shaft as independent claims 1 and 9 claim it; further which has such a connector of resin having a vibration mode different from the washing shaft, fixedly secured to the rear wall of the rotor with bolts passed through the fastening pass through holes in the rotor as independent claim 9 claims it; further which has an annular washer in close contact with an outer side of the rotor, and having fastening pass through holes in a surface thereof in correspondence to the fastening pass through holes in the rear wall of the rotor, and positioning holes in which the positioning projections on the connector are inserted as independent claim 17 claims it. Consequently the subject matter of independent claims 1, 9 and 17 is new and involves an inventive step.

**WRITTEN OPINION OF THE
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Claims 2 to 8 are dependent upon independent claim 1, claims 10 to 16 are dependent upon independent claim 9 and claims 18 to 20 are dependent upon independent claim 17, thus also satisfy the requirements with respect to novelty and inventive step.

Industrial applicability is given.
